The Edmund 3-Inch f/6 Reflector Telescope User's Manual.

No. 31,308 711808

Edmund Scientific

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Warning

Never point your new telescope or any other optical instrument at the sun. Concentrated direct sunlight can blind you in seconds!

LIMITED ONE YEAR TELESCOPE WARRANTY

EDMUND SCIENTIFIC CO. warrants to the original retail purchaser that each telescope manufactured by Edmund Scientific Co. is and will be free from defects in materials and workmanship for a period of one year from the date of purchase. During the warranty period, Edmund Scientific Co. will repair or replace at its option any such defective telescope or part thereof at no cost to the purchaser for parts or labor.

Should any defect occur within the warranty period, purchaser must promptly return the product prepaid together with proof of purchase to: **Edmund Scientific Co., 101 East Gloucester Pike, Barrington, New Jersey 08007, Attn: Return Goods Dept.** or to the retail establishment where purchased.

This warranty shall not apply if it is shown that the defect or malfunction was caused by abuse, mishandling or unauthorized repair.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. If you have any questions concerning this warranty, or the product, please write us at the above address.

First Printing, Sept., 1981

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I. INTRODUCTION

People have always wanted to see farther and clearer, to explore the natural world around them, to roam among the fascinating worlds in the sky.

Over the centuries, they have used many tools. But only one—the telescope—has both brought their world closer to them and illuminated the silent mystery of the twinkling stars. Only the telescope has enabled man to see what is beyond Earth—the quiet, awe-inspiring beauty of the Milky Way, the mountains and craters of the Moon, the amazing rings of Saturn and the multitude that is our universe. All are still there, waiting for you to see, to study, to question, to answer.

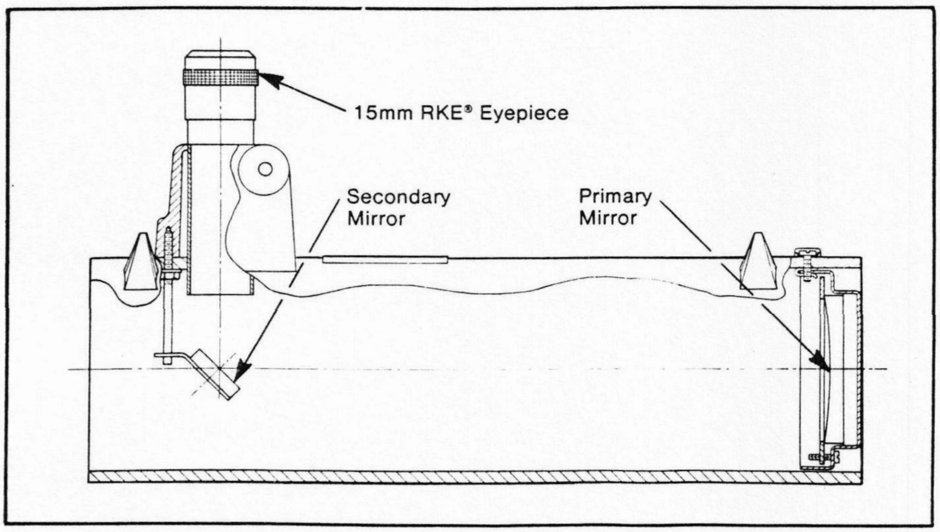
Newtonian Telescope

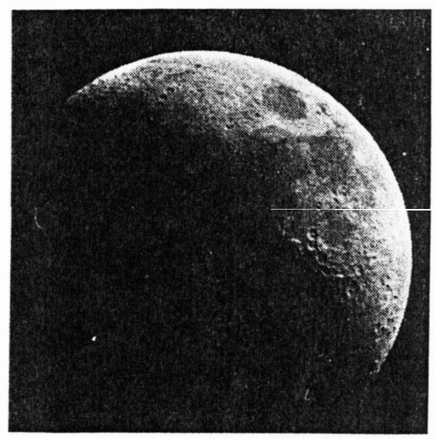
Your new Edmund 3-Inch f/6 Reflector Telescope is your tool for exploring these universal mysteries. A classic "Newtonian" telescope, it utilizes optical principles established by the renowned English scientist Sir Isaac Newton in 1668. It is the same principle used in many of the world's famous telescopes, such as Mt. Palomar, one of the largest, most powerful optical telescopes ever built in the United States.

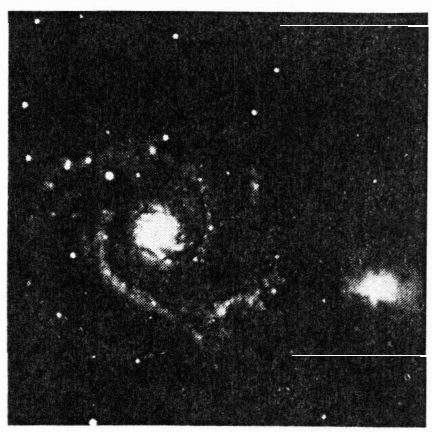
In a Newtonian telescope, a large "objective" or primary mirror at the bottom of the telescope tube collects and focuses light. Light striking the mirror is reflected back up the tube to a smaller "diagonal" or secondary mirror which directs the light to the side of the tube where an "eyepiece" magnifies the focused image for viewing.

The Edmund 3-Inch f/6

Unlike Newton, whose telescope used crude metal mirrors which tarnished easily, you now own a precision optical instrument which incorporates modern, state-of-the elements, enabling you to see clearer, brighter images than those ever seen by Newton. With your Edmund 3-Inch f/6, you can view the gaping craters, precipitous mountains and flat dust plans of the Moon. Beyond are the planets of our solar system, each a fascinating world. You'll especially enjoy Jupiter and Saturn, but you can also glimpse enough of Mercury, Venus and Mars to begin to see a glimmer of their natures. Farther into space, and a little harder to see, lie reddish stars, star clusters, cloudy nebulae and other wonders most people only see in highly enlarged photographs. Through your telescope they won't look the same, or as large as in such photographs, but you will be one of the few actually to have experienced these cosmic sights firsthand.







Specifications

Telescope Type: Newtonian Reflector

Primary Mirror: Pyrex® base, 3" (76mm) diameter, 17½" (445mm) F.L. parabolic mirror. Aluminized, overcoated and figured to ⅛ wave.

Clear Aperture: 2⅞" (75mm) diameter, f/6.1 effective focal ratio.

Primary Mount: Closed-cell, factory-collimated for precise alignment, adjustable.

Secondary Mirror: Aluminized and overcoated rectangular mirror, 25mm x 35mm, flat to ⅛ wave.

Secondary Mount: Secondary is affixed to a diagonal stalk, factory-aligned, adjustable.

Eyepiece: 15mm F.L. RKE® Standard 1¼ outside diameter.

Focuser: Smooth, positive grip rubber roller focusing mechanism. Focuses from 50 feet to infinity.

Power: 30X with supplied eyepiece. Up to 56X with optional accessory RKE® eyepieces.

Field of View: 1.6°

Telescope Tube: Lightweight, impact-resistant, heavy-wall, ABS plastic treated internally with an anti-reflection black coating.

Telescope Mount: Fixed 40° Polar Axis Equatorial.

System Weight: 10 lb, including tripod

II. SETTING UP YOUR TELESCOPE

The Edmund 3-Inch f/6 Reflector Telescope is a precision optical instrument, not a toy. It should be treated with the same care you would give a fine, expensive camera or other optical system. The following instructions were prepared to acquaint you with your new telescope, its operation, its optical system and its care. Please follow the instructions carefully.

Unpacking

Your new telescope is carefully packed as two parts within a form-fitting box: one part is the telescope with its yoke mount, the other is the telescope tripod with mounting head.

In removing the two parts be careful not to damage the box or its packing, and do not discard either. It is recommended that you save both the box and form-fitting packing for future storage or shipping of your telescope.

You should unpack your new telescope in your home, preferably on a padded surface such as a rug or mat. Remove the tripod assembly first and lay it beside the box. Then remove the telescope assembly and lay it on the mat so that the eyepiece assembly is on the top.

If the foam packing material sticks to either assembly, do not yank the part to free it. Simply, and gently, work the part free with a slight rocking motion.

Assembly

The first step in assembling your telescope is setting up the tripod.

To do this, simply grasp the black mounting head in one hand, holding it straight up. With the other hand, spread the three tripod legs out as far as they will go. Leg stops in the bottom of the mounting head limit the legs' travel. When each leg is against its stop, the tripod is standing at the correct height.

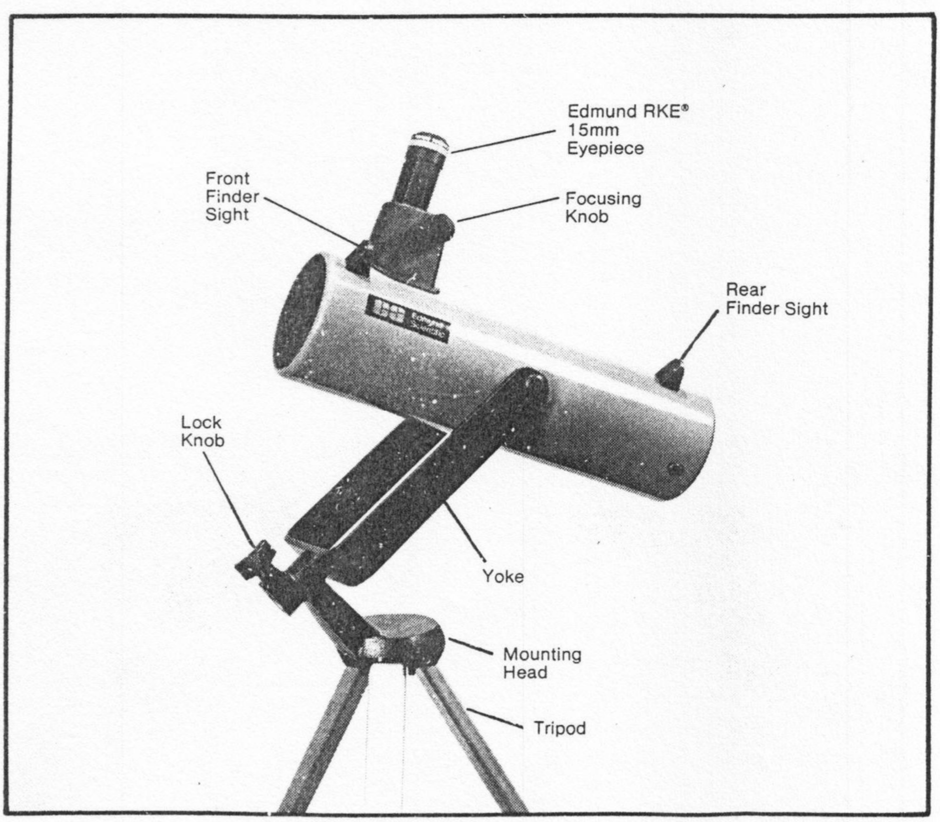
Next, loosen the black knob on the mounting head until the knob's screw threads are no longer protruding into the telescope yoke mounting hole.

The tripod is now ready to receive the telescope assembly.

Now, carefully pick up the telescope assembly and insert the steel shaft on the bottom of the telescope yoke into the hole on the mounting head. Insert the shaft fully. No part of the shaft should show between the bottom of the black yoke and the black mounting head.

Next, tighten the black knob on the mounting head sufficiently so that the shaft will not pull out. Do not overtighten. The yoke should be free enough to rotate.

Next, loosen the black knob on the side of the telescope tube, near the top of the yoke mount. Turn the telescope in the yoke mount until the eyepiece is on top. Then tighten the knob sufficiently to hold the telescope in position. Again, do not overtighten.



III. USING YOUR TELESCOPE

To begin your personal exploration of the heavens, take your assembled telescope and tripod outside and set it up on a flat paved or unpaved surface.

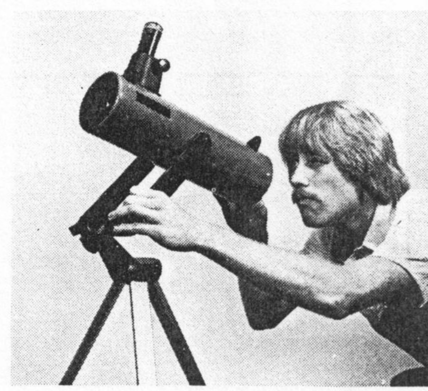
If it is daylight when you first take your telescope outside, point the telescope in the general direction of an interesting land object in the distance, such as a house, a telephone pole, a car, etc.

To assist you in aiming, the telescope is equipped with a "peepsight," two black mounts with holes to the left of the eyepiece.

To aim the telescope, simply look through the smaller hole near the rear of the telescope and move the telescope so the object you want to see is lined up and visible through both the small hole and the larger hole near the front of the telescope.

Do not aim your telescope at the sun! Concentrated direct sunlight can blind you in seconds.

When you have the object lined up in both holes, turn the black knobs on the yoke and mount to hold the telescope in position.



Now look through the telescope's eyepiece and turn the knobs on the eyepiece mount until the object is sharply focused. Don't be surprised when you see your target upside down, or sideways. As in virtually all telescopes, both reflectors and lens-type refractors, the image seen through your new telescope is inverted.

When looking at objects in space, this really doesn't matter since there is no up or down in space. But to see a land object right side up, simply strand with your back to the object viewed, being careful not to block the telescope, and look into the eyepiece. The image will appear right-side-up.

As you practice sighting, focusing and viewing land objects, you are sure to notice that your telescope doesn't turn up, down and around like construction cranes and gun turrets on ships do. That's because your telescope mount is designed for optimum viewing of objects in space—and celestial objects move differently than things do on Earth.

Land-Gazing

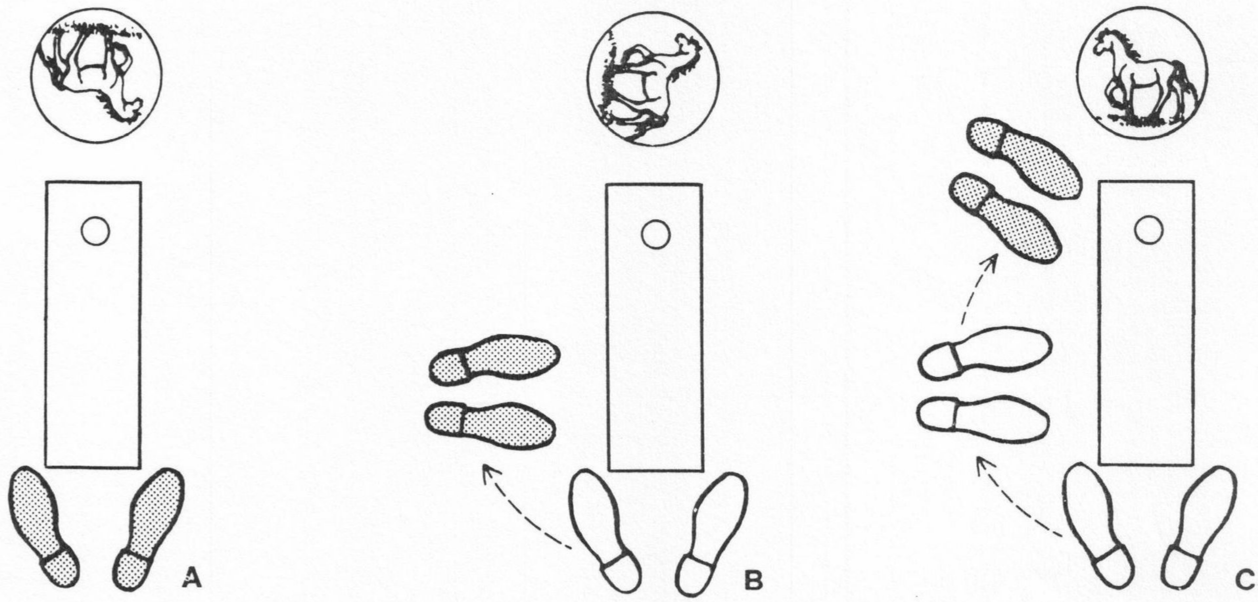
Your telescope is designed for optimum astronomical viewing and, as in both reflector and refractor types, the image you see through the eyepiece appears upside down. As explained earlier, this doesn't matter when you are observing an object in space where there is no up or down, but it is annoying to some when viewing terrestrial sights. It is also a problem easily remedied.

Many people look through the telescope's eyepiece while standing directly behind the instrument as shown Illustration A. Note that as you move toward the front of the telescope, as shown in Illustration B, the image appears sideways. Now if you move a bit closer to the front, as shown in Illustration C, the image appears right-side-up.

Just follow this easy procedure when viewing terrestrial objects and you'll see things in their proper perspective.

Tripod Adjustment

Each leg of your telescope's tripod is equipped with a slotted screw at the top which can be used to adjust the friction of the leg hinge. Although the friction is factory-set to hold the leg at any position you wish, over time the friction could lessen. To increase the friction simply turn the screw slightly with a slotted screwdriver. Do not overtighten. The leg should swing easily, but not loosely.

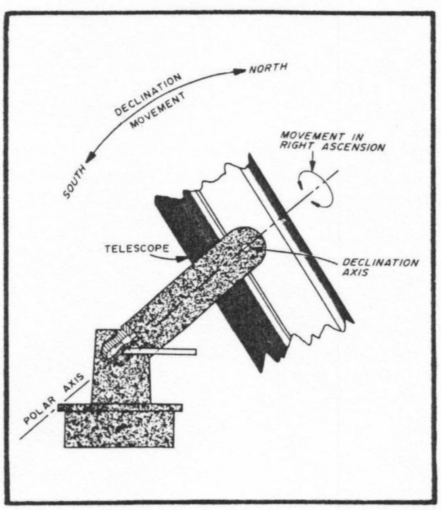


Polar Orientation

All objects in space rotate from right to left (East to West) around a point called the "North Celestial Pole." This point is in the north sky very near a star called "Polaris."

Your telescope mount is designed to be easily lined up on this star so that you can follow other celestial objects with a single motion as they rotate around this point.

To orient your telescope properly, locate the Big Dipper in the night sky visually, and follow the "pointer stars" at the front of the Dipper north to Polaris, as shown in the diagram.



Next, turn the telescope tube so that it is lined up with the sides of the yoke. Tighten the lock knob. Now pick up the entire tripod and telescope assembly and turn it until the tube is pointing in the direction of Polaris. Look through the peepsights and again pick up and turn the entire telescope assembly until you see Polaris lined up in the peepsight.

When you've accomplished that, your telescope is properly oriented to view celestial objects the way professional astronomers do.

Target Sighting

Once you have set up your telescope to view celestial objects by orienting it to Polaris, target sighting is not so much a matter of procedure—as a matter of choice. And it is literally a choice of millions.

The Edmund Rotating Star & Planet Locator, included with your telescope, is a map of the heavens that uses Polaris as the center point. Plotted by George Lovi, a noted astronomer and illustrator, it shows the location of 500 stars, their relationship to Polaris, the horizon and the time of day. The Star & Planet Locator is easy to use and comes with its own instructions. Read them, and the sky will become as familiar to you as your backyard is now.

Focusing

There is no such thing as exact focusing of a telescope. Actually the image forms at a very precise point, but you can see the image at various settings of the eyepiece because your eye can adjust for either long or short focus.

The best general practice is to focus "long." This is done by turning the focusing knobs until the eyepiece is out a little more than is necessary, and then focusing in just enough to get a sharp image. The "long" focus causes your eye to focus as for a distant object—the most comfortable position. If you focus to the maximum "in" position that still retains a sharp image, the eye accomodates for a close object. This position gives slightly greater magnification, but is somewhat more tiring.

NOTE: The two tabs at the top of the eyepiece focusing tube are bent in opposite directions by design. The tab bend inward is to hold the eyepiece tightly within the focusing tube. The tab bent inward is to hold the eyepiece tightly within the focusing tube. The damaging the interior of the telescope. Essentially, it acts as a "stop" that ends the tube's downward travel when you turn the focusing knobs in.

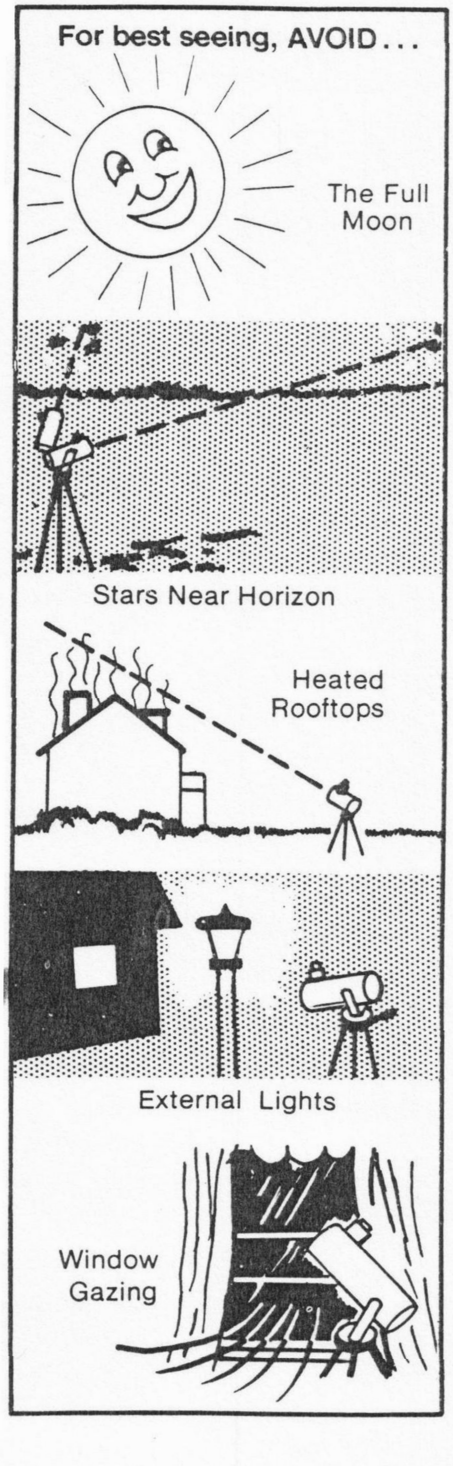
Observing Hints

Dark-Adapting. It takes some time for the human eye to adjust to darkness, sometimes as much as 10 to 30 minutes if you have just stepped out of a brightly lit home. If the weather outdoors is a bit chilly, you can get your "night eyes" more comfortably by staying indoors in a darkened room. If you need light to look at your Star &

Planet Locator or to read notes outside, use a flashlight covered with a red filter, or red or brown paper.

Although your telescope doesn't have to adjust to darkness, it does have to adjust to the temperature difference between the inside of your home and the outside. When you set it up outside, you'll have to wait for it to become "normalized," that is, for the mirrors and the air in the tube to reach the temperature of the night air outside the tube. Until normalization is achieved, there may be noticeable distortion of any image seen through your telescope.

Wearing Eyeglasses. If you wear eyeglasses, take them off if you are farsighted. Your unaided eyes will see distant objects clearly, and removing your glasses will let you get as close to the eyepiece as necessary. Near-sighted persons have a different problem: if you remove your glasses you lose your vision for distant objects. The best practical solution is to keep your glasses on and use eyepieces with long "eye relief," that is, the distance of your eye from the eyepiece. The 15mm RKE® eyepiece supplied with your telescope will work fine with glasses.



Persons with astigmatism should keep their glasses on.

Eye Position. Your eye must not touch the eyepiece but, at the same time, it must be centered on the light beam coming through it. Once your eyes are dark-adapted, you'll notice that the sky as seen in the telescope is not really black, but rather, a luminous gray. Given this target, your eye will automatically center in the eyepiece.

Good-Seeing. The star-gazer's "good-seeing" depends on many things, not the least of which is the atmosphere one looks through. The main body of the Earth's atmosphere is about ten miles thick straight up. At 45 degrees, it is about 15 miles thick, and near the horizon the air blanket can be 100 miles or more. This atmosphere is constantly in motion—shifting, swirling, boiling—and it is a rare night when even professional astronomers can use telescopes with powers over 300X, regardless of the size or quality of their telescopes.

On the other hand, clear air atmospheric disturbances are seldom a problem for telescope powers from 16 to 60X—the optimum power range of your new telescope—except for extreme cases. These include looking over a hot chimney, and through an open window from a warm room into the cold outside air. Looking through a glass window pane is worse. You simply magnify the imperfections in the glass.

A brief list of things to avoid in your quest for good-seeing includes:

- the full Moon which tends to overpower other things in the night sky,
- heated rooftops and chimneys,
- stars near the horizon,
- external lights near you,
- bright city and street lights which reflect a bright, hazy glow in the sky.

IV. MAINTAINING YOUR TELESCOPE

Your new telescope was designed with minimum care in mind. It is a precision optical instrument and should be treated with the same care you give an expensive camera. That means making sure water, sand, dirt and other contaminants don't enter the optical system where they can cause serious damage.

Cleaning

Telescope Tube. Should the outside of the telescope tube become dirty, wipe it clean with a damp cloth only. Do not use cleansers or abrasive products. Do not attempt to clean the inside of the tube with the mirrors in place. Consult the Appendix for proper mirror removal procedures.

Eyepiece. To clean the eyepiece, remove the eyepiece from the focusing tube (making sure that nothing falls into the open tube) and clean as you would any camera lens using lens cleaning tissue or cloth. Brush or blow dust particles away with a camel's hair brush and a hand blower. These are available in most camera shops.

Mirrors. In most cases, if proper precautions are taken to avoid contamination, the mirrors will only rarely require cleaning. If they do, first remove them following the instructions in the Appendix. Never, never, touch the mirror surfaces with your fingers. They are "front-surface" mirrors. Unlike the mirrors in your home, the reflective surface is on the front side, not the back. Touching the front surface can permanently damage the mirrors.

To clean either the primary or secondary mirror, use. . .a syringe or very lightly stroke with a soft cloth or camel's hair brush.

Storing

When not in use, store your telescope in an area of medium to low humidity to avoid moisture condensation. The best way to store your telescope is in the box it came in. The box was designed to protect your telescope during shipment and will certainly protect it from the less serious hazards to be encountered in your home.

Do not store your telescope by leaning it against a wall with the legs folded. It's one sure way eventually to wind up with a broken telescope.

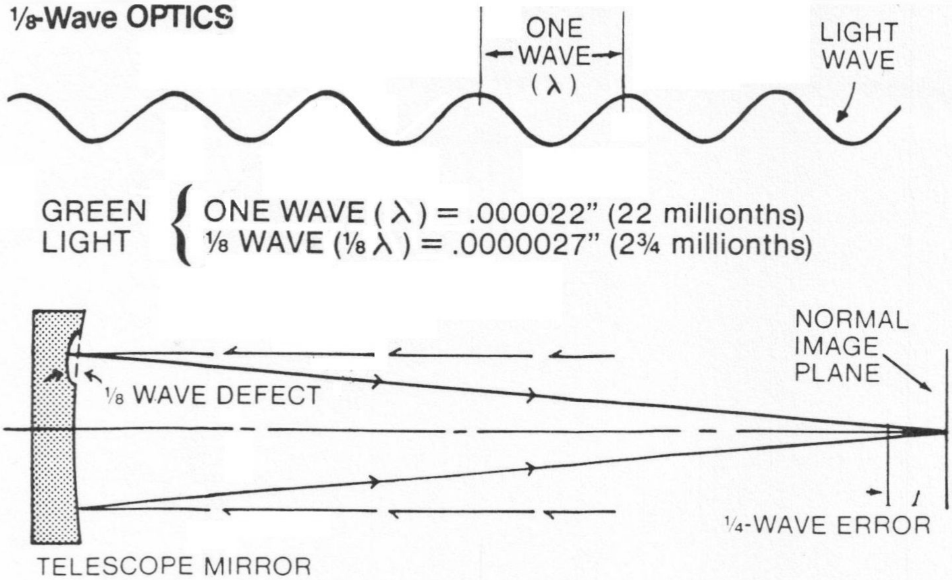
If you cannot keep the shipping box, the next best way of storing your telescope is to disassemble it into its main two components and carefully place them in a closet or other secure area.

Factory Service

Should your telescope be damaged in a fall, by contaminants, or otherwise so that it is rendered nonfunctional, contact our Customer Service Department for advice, or to arrange factory repairs.

The address is:
Customer Service Department
Edmund Scientific Co.
Edscorp Building
Barrington, New Jersey 08007
or call (609) 547-3488

⅛-Wave OPTICS



The usual tolerance for high-precision optics is one-quarter of the wavelength of light—no part of the glass surface must depart more than ¼ wave or 5½ millionths-of-an-inch from the specified shape. Compare this with a sheet of paper which has a thickness of about 200 waves! The Edmund Astroscan® 2001 betters this tolerance with optics of ⅛ wave. In the case of a telescope mirror where light transverses the distance twice, a ⅛ wave defect on the mirror will result in a ¼ wave error at the image plane as shown. This gives nearly perfect imagery. Further narrowing of the tolerance to 1/10 wave or less is more in the nature of advertising claims than any appreciable gain in definition.

V. OPTICAL SYSTEM

⅛ Wave Optics

Your Edmund 3-Inch f/6 Reflector utilizes ⅛ wave optics. The usual tolerance for high-precision optics is ¼ the wavelength of light—that is, no part of the glass surface must depart more than ¼ wave, or 5½ millionths of an inch from the specified shape. Compare this with the thickness of this sheet of paper which has a thickness of about 200 waves!

The Edmund 3-Inch f/6 betters this tolerance with optics of ⅛ wave. In the case of a telescope mirror where light transverses the distance twice, a ⅛ wave defect on the mirror will result in a ¼ wave error at the image plane. This gives nearly perfect imagery. Further narrowing of the tolerance to 1/10 wave or less is more in the nature of advertising claims than any appreciable gain in definition.

Magnification

The magnification of a telescope is calculated by dividing the focal length (FL) of the objective by the focal length of the eyepiece:

$$\text{Magnification} = \frac{\text{FL of objective}}{\text{FL of eyepiece}}$$

For the Edmund 3" f/6 this is:

$$\text{Magnification} = \frac{445\text{mm}}{15\text{mm}} = 29.67\text{X}$$

Most beginners consider magnification paramount. It isn't. As a matter of fact, "high power", or more properly high magnification, is virtually synonomous with narrow field of view. The narrower the field, the harder it is to find star fields. Experienced observers know this and use the lowest available power 90% of the time.

The aperture of the telescope is the primary factor in determining useful magnification. In actual practice, magnifications beyond 60X per inch of objective diameter do not produce any appreciable increase in resolution and, in fact, have serious drawbacks. They are: decreased image brightness; decreased field of view; vibration problems; and atmospheric interference problems. Telescope experts agree that the top useful power is 50X to 60X per inch of objective aperture. No additional detail can be obtained with higher powers.

Your new telescope was designed to avoid the disappointment many novice astronomers experience with high power telescopes while at the same time offering versatility in power selection through a choice of optional eyepieces and equipment.

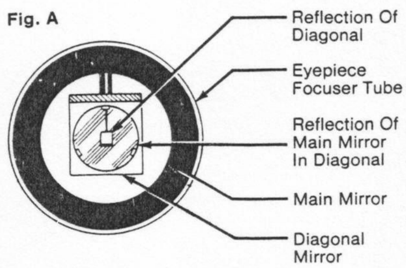
MAGNIFICATION OPTIONS

Eyepiece	Magnification	Field of View	Best Astronomical Applications
28mm RKE® (optional	16X	3.0°	Moon, star clusters, milky way, neubulas.
21.5mm RKE® (optional)	21X	2.3°	Increase magnification with slightly narrower field of view.
15mm RKE® (standard)	30X	1.6°	Moon, planets, double stars, star clusters, nebulas.
12mm RKE® (optional)	37X	1.4°	Increased magnification with slightly narrower field of view.
8mm RKE® (optional)	56X	.09°	Moon, planets, double stars.

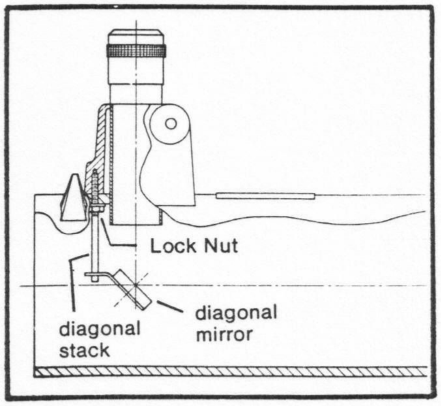
Mirror Collimation

"Collimation" is the term used to describe the procedure for aligning telescope mirrors. Your telescope was precisely collimated at the factory and should not require realignment during normal use. However, the following procedure must be followed should realignment ever become necessary.

Fig. A



1. Point the telescope at an evenly illuminated surface, such as a white ceiling or wall.
2. Remove the eyepiece and look through the tube of the focusing mount, keeping your eye about five inches away from, and centered on the end of the tube.
3. Correctly aligned mirrors will appear as shown in FIGURE A. If the mirrors check out, the telescope does not require adjustment. If misalignment is evident, then proceed.



Secondary Alignment:

1. Your telescope's secondary mirror is mounted on a diagonal stalk which is threaded into the eyepiece focusing mount. The thread depth automatically centers the mirror in the tube. The only adjustment which may necessary is left or right orientation of the mirror. FIGURE B illustrates a correctly oriented secondary. FIGURE C, shows a secondary turned a little off-center.
2. To correct for an off-centered secondary, simply grasp the secondary mirror mounting flange (Do Not Touch The Front Of The Mirror!) while looking through the eyepiece focusing tube. Then turn the mount until what you see matches FIGURE B.
3. Should finger-strength be insufficient to rotate the diagonal, turn the telescope so that it is facing down to the floor with the primary mirror at the top.
4. Next, use a small open-end wrench or pliers to loosen the lock nut. Loosen the nut only slightly, and then align the secondary by hand.
5. When the mirror is aligned, retighten the stalk lock nut.

Primary Alignment:

1. Your telescope's primary mirror cell is equipped with three adjustment screws, which also hold the mirror in its cell. These may be tighten or loosened as necessary for directional alignment of the mirror.
2. **NOTE:** the image will move away from the screw you tighten. Keep this in mind as you perform the following.
3. Look into the telescope as you did for the secondary mirror. You will see the reflections of the main mirror as well as the secondary mirror. The reflection of the diagonal should be centered in the image of the primary mirror as shown in FIGURE D. FIGURE E illustrated the image of a main mirror improperly aligned.
4. To correct for misalignment, simply turn the primary adjustment screw most likely to correct the condition.

Secondary Mirror

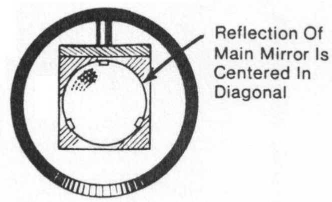


Fig. B

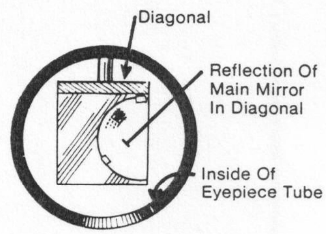


Fig. C

Primary Mirror

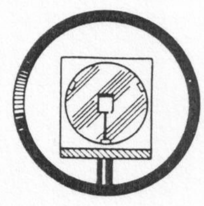


Fig. D

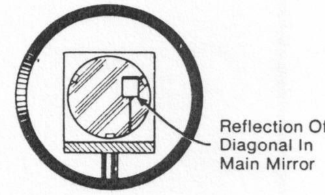
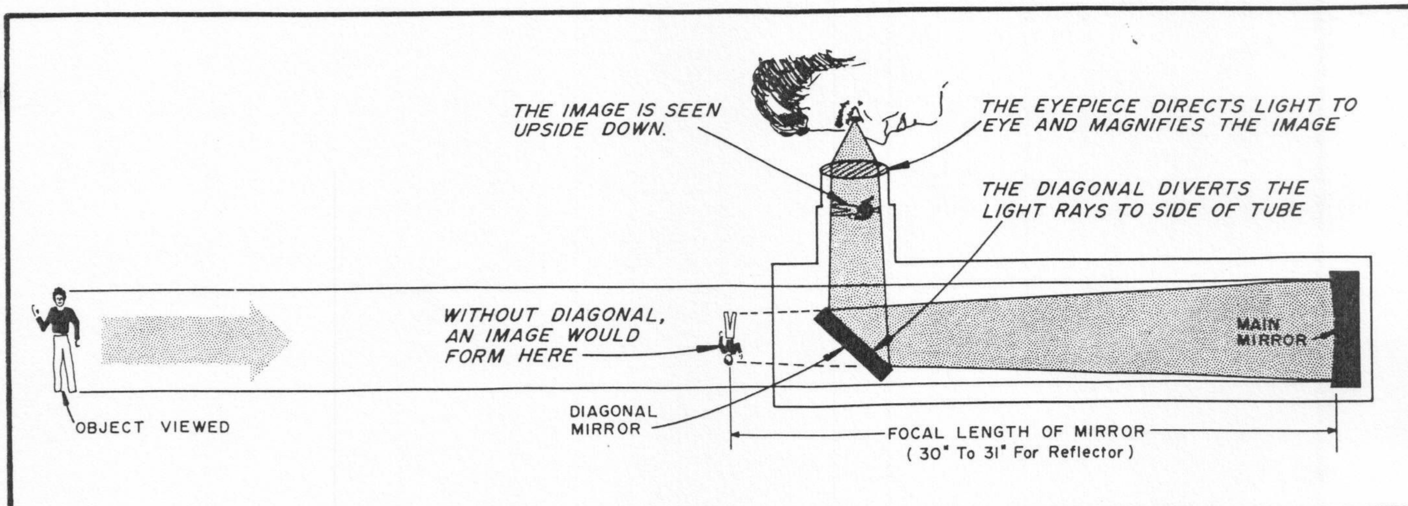
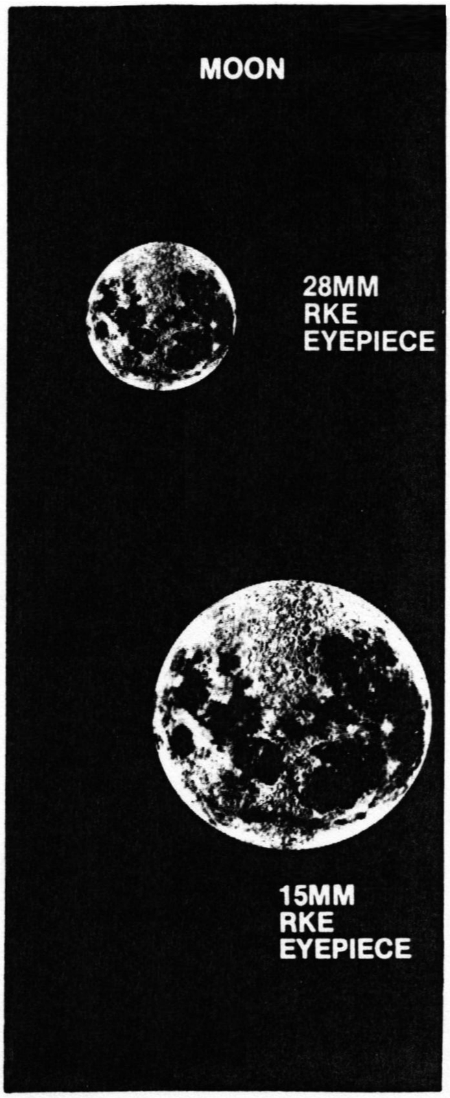


Fig. E





Mirror Removal

It is highly unlikely that it will ever be necessary for you to remove the mirrors from your telescope. However, if for some reason it becomes necessary, the following procedure should be used:

Secondary Mirror:

1. Turn the telescope tube so that the aperture (opening) at the front of the tube faces down. This prevents any objects from falling down the tube, striking the primary mirror as you work on the telescope.
2. Use an open end wrench or a small pliers to loosen the diagonal stalk lock nut.
3. When the nut is loosened, unscrew the entire secondary mirror mount from the tube. The diagonal stalk is threaded and can be removed easily. Do not touch the surface of the secondary mirror. It is a front-surface mirror and can be easily damaged.

Reverse the procedure to reinstall the mirror.

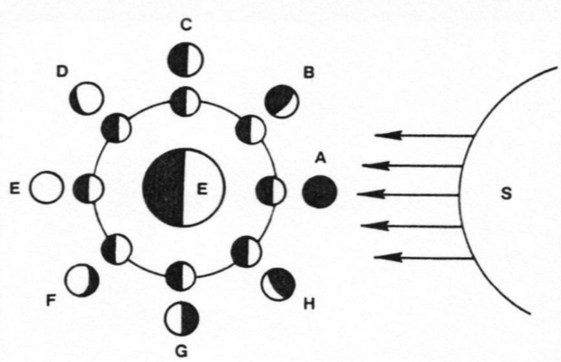
Primary Mirror:

1. Remove the telescope and yoke mount assembly from the tripod assembly.
2. Rotate the yoke, so that the base of the yoke is at the front of the telescope.
3. Place the telescope on a table with the eyepiece mount on the top.
4. Remove the three black plastic caps on the rear sides of the telescope tube. These caps cover the primary mirror cell mounting screws.
5. Grasp the primary mirror cell from the rear while removing the mounting screws. Then withdraw the mirror in its cell from the telescope tube. Do not touch the mirror's surface. It, too, is a front-surface mirror.

Reverse the procedure to reinstall the mirror.

VI. CELESTIAL WONDERS

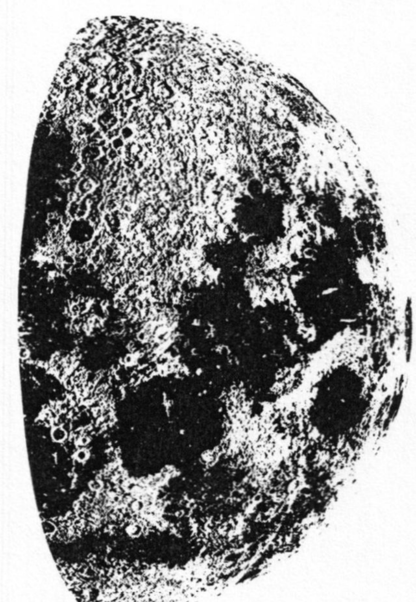
The moon is the most spectacular sky object for a telescope. It is revealed in exquisite detail by the 3 inch f/6.
Its crater-battered surface is seen to be incredibly varied from seemingly perfectly flat plains to jagged mountain peaks and valleys. And almost everywhere are swarms of craters ranging from giants over 100 miles wide to basins three or four miles across at the limit of detectability.
Follow the moon through its phases from night to night because each night new surface features are progressively brought into view near the advancing terminator—the zone between the illuminated and unilluminated portions of the lunar face. The terminator region is especially dramatic because of the stark shadows and strong relief that make the rugged lunar surface almost jump out.
If you have optional eyepieces for higher magnification you will have no trouble using them on the moon. At lower powers the moon seems to hang like a silver ball in a black void.

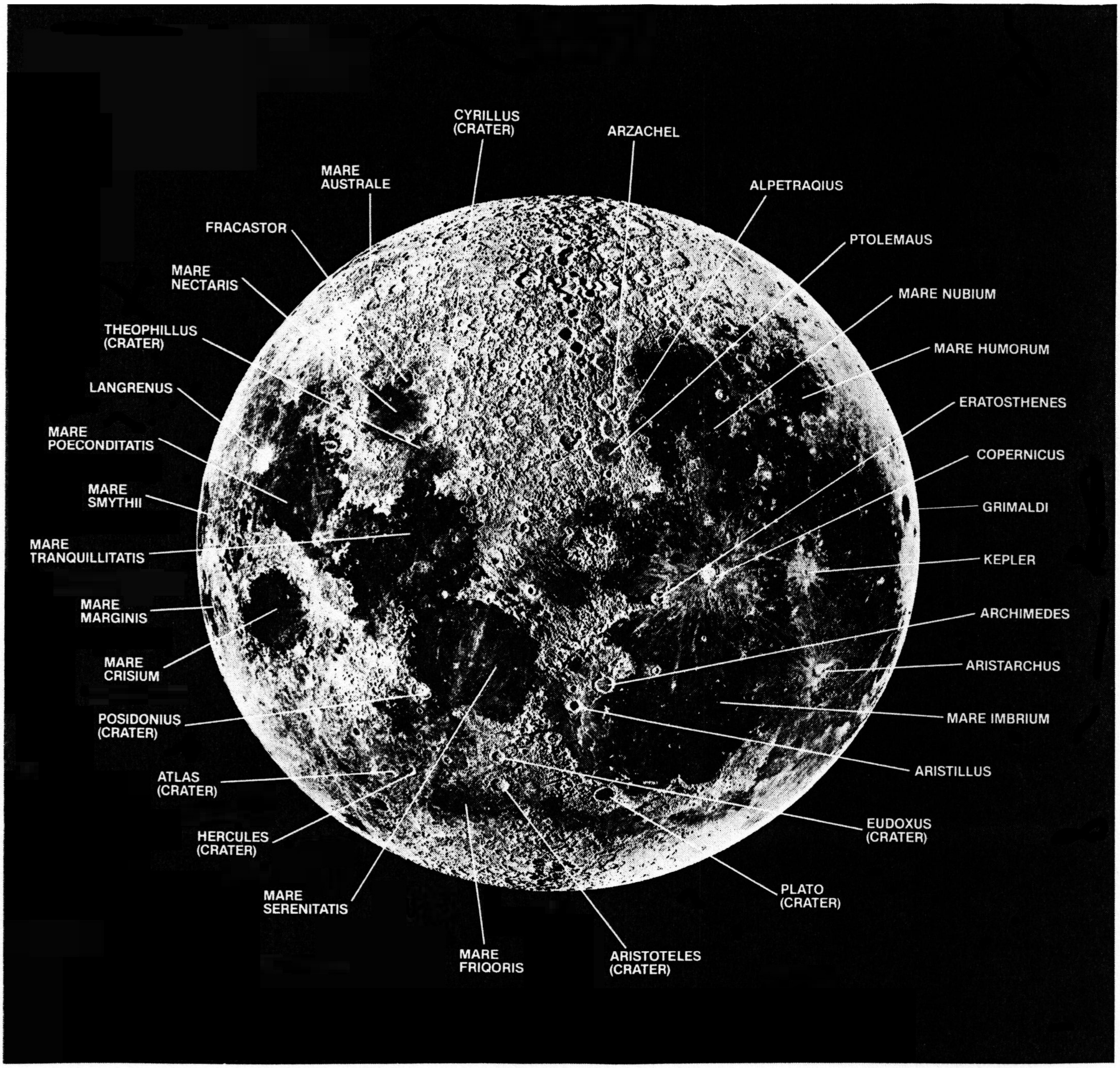


PHASES OF THE MOON

Figures on the inner circle show the moon in its orbit; those on the outer circle represent the moon's corresponding phases as seen from the earth;
A, New moon (invisible); **B, Crescent** (waxing moon); **C, First Quarter** (half-moon); **D, Gibbous; E, Full moon; F, Gibbous; G, Last quarter** (half-moon); **H, Crescent** (waning moon); **S, Sun; E, Earth.**

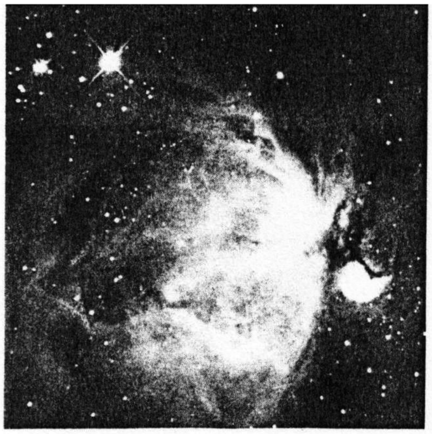
Gibbous Moon





The sun is our nearest star and a fascinating astronomical object. However, DO NOT look directly at the sun through your 3 inch f/6 or any other telescope. Severe eye damage could result because the telescope intensifies solar heat just the way a magnifying glass does. A completely safe way to observe the sun is by projecting its image on a white card held about a foot away from the eyepiece. Align the scope with the sun by observing the instrument's shadow. When the shadow is smallest, the sun should be centered and visible on the card. DO NOT attempt to align the telescope on the sun by using the finderscope or by sighting along the shadow—it is not difficult. The sun's projected image should show several small black spots, known as sunspots. The spots usually last for several weeks and change position day to day as the sun rotates (one solar rotation takes about four weeks). Structural detail in the larger spots should be evident.

The planets Jupiter, Venus, Mars and Saturn will all show distinctive features in the 3 inch f/6 telescope. Venus is the brightest object in the sky apart from the moon and usually has a distinct phase like a moon's —and for the same reason: We are looking at parts of its illuminated and unilluminated face. Jupiter, second brightest of the planets, is perhaps the most interesting because its four large moons, which are easily visible in the 3 inch f/6, move back and forth from side to side as they change their position relative to Jupiter on a nightly basis. Jupiter itself appears as an oval disk and sharp-eyed observers will detect horizontal stripes, the distinctive cloud belts of the planet. Saturn's rings come into view in 3 inc f/6 even at 32x. Higher magnification will show them a little more plainly and you should be able to see Titan, the largest moon in the solar system, which orbits Saturn in a period of 16 days. Mars is generally a disappointment even in large telescopes. The 3 inch f/6 will show it as a small ruddy disk, occasionally with a white polar cap. The other planets are either too distant or too small to show detail in 3 inch f/6. Higher magnifications can usually be used to advantage when viewing the planets. Double stars are suns like our own that have companion suns. About 100 wider-spaced double stars can be picked up with the 3 inch f/6, some

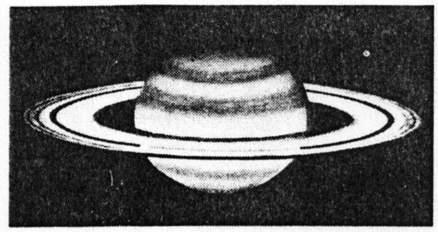


Orion Nebula J. Cocozza
M-42

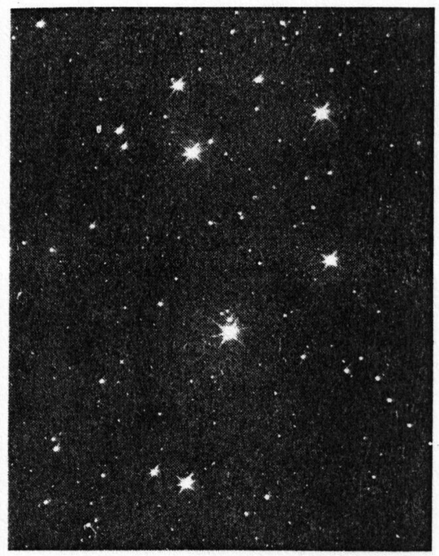
Lagoon Nebula J. Cocozza
M-8

Andromeda Galaxy J. Cocozza
M-31

Star Clouds in Cygnus D. Healy



Saturn at 111X (enlarged twice)



Pleiades M45 J. Cocozza

with beautiful contrasting colors—blue and gold, yellow and red and so on. Although they may not sound exciting, some of them are strikingly beautiful and delicate. A list of double stars and their locations can be found in the Edmund Sky Guide.

The Milky Way star clouds are a stunning sight through 3 inch f/6. One of the most pleasant activities amateur astronomers engage in is scanning the Milky Way on a mild summer night. The 3 inch f/6 telescope is a perfect companion for this activity as hundreds of stars come into view as the telescope sweeps across the misty band of our galaxy.

Nebulas are colossal clouds of dust and gas that exist throughout our galaxy. Astronomers believe new stars are being born in many nebulas. Some of these clouds appear to be illuminated by the stars that have just been created within them, such as the Orion Nebula. Other nebulas, such as the Ring Nebula in the constellation Lyra, are created during the death throes of stars. Both of these objects and many more are within the grasp of the 3 inch f/6. See the Edmund Sky Guide for details.

Galaxies are enormous cities of stars, some containing trillions of suns. The nearest major galaxy, the Andromeda Galaxy, is two million light-years distant and is barely visible to the unaided eye. Its basic shape can be detected with 3 inch f/6. Other, more distant galaxies are available with this telescope, though few details of them are seen in anything but the largest amateur instruments.

When observing faint celestial objects, be sure to select the clearest, darkest nights possible, avoiding bright moonlit nights. Additionally, street, house, and city lights may also interfere with a clear view of faint celestial objects. If your first look through the 3 inch f/6 telescope is still not as clear as hoped even under these conditions, it may be because your eyes have not yet adjusted to the dark. Wait about 15 minutes for your eyes to dilate to their fullest extent.

When your eyes have achieved full "night vision," use the technique of averted vision. Look slightly away from the object, to the side of the field of view. You'll notice the object will appear more intense.